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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| EXAMINER |
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VINH, LAN

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| ART UNIT | PAPER NUMBER |
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1765

DATE MAILED: 08/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/692,661

Applicant(s)

PAW ET AL.

Examiner

Lan Vinh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Response to Amendment/Arguments

1. The indicated allowability of claim 10 is withdrawn in view of the newly discovered reference(s) to Merchant et al (US 6,458,289). Non-final rejections based on the newly cited reference follow.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2-3, 5, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ilardi et al (US 5,466,389) in view of Sun (US 6,641,630) and further in view of Merchant et al (US 6,458,289)

Ilardi discloses a method for cleaning microelectronic substrate. The method comprises the steps of:

supplying a substrate fabricated substantially of silicon (col 5, lines 48-50)

exposing the substrate to an alkaline cleaner solution (col 3, lines 56-60), which reads on exposing the substrate to an etching bath containing a caustic etching solution the cleaner solution contains additives such as chlorite salt, an iodate salt (col 4, lines 21-28)

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Unlike the instant claimed inventions as per claims 1-3, Ilardi fails to disclose using additive such as a mixture of potassium iodate and sodium iodate in the caustic cleaner solution

Sun discloses an alkaline CMP solution contains additive such as a mixture of potassium iodate and sodium iodate (col 6, lines 8-10, col 7, lines 35-38)

Since Ilardi discloses that the cleaner solution contains additives such as iodate salt, chlorite salt, one skilled in the art at the time the invention was made would have found it obvious to modify Ilardi method by adding a mixture of potassium iodate and sodium iodate in the caustic cleaner solution in view of Sun teaching because Sun discloses that iodates are suitable oxidizing agent for a polishing/cleaning composition (col 3, lines 5-16)

Ilardi and Sun fail to disclose the steps of removing a portion of the solution from the etching bath, exposing the portion of removed solution to the additive and returning the exposed portion of removed solution to the etching bath

Mechant discloses a method of polishing comprises the steps of removing a used aqueous polishing slurry from the polishing solution/portion of the solution from the etching bath, exposed the used slurry/portion of the removed solution to additives and recirculating/returning the exposed slurry/solution to the polishing solution (col 4, lines 45-67; col 5, lines 1-5; fig. 4)

One skilled in the art at the time the invention was made would have found it obvious to modify Ilardi and Sun method by adding the step of removing a portion of the solution from Ilardi etching bath, exposing the portion of removed solution to the additive as

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taught by Sun and returning the exposed portion of removed solution to the etching bath in view of Merchant teaching in order to produce a freshly-mixed and conditioned etching solution, thus preventing the contamination of wafers during the alkaline cleaning step

Regarding claim 5, Ilardi discloses that the alkaline cleaner comprises 0.1-10 % of additive (col 13, lines 10-13), which reads on wherein the additive has an additive concentration of at least about 0.01% by weight.

Regarding claim 12, Ilardi discloses that any suitable alkaline may be used in the cleaner composition (col 2, lines 65-66)

4. Claims 6-8, 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ilardi et al (US 5,466,389) in view of Sun (US 6,641,630) and Merchant et al (US 6,458,289) and further in view of Maeno et al (US 5,714,407)

Ilardi as modified by Sun and Merchant has been described above. Unlike the instant claimed inventions as per claims 6-8, Ilardi, Sun and Merchant fail to disclose forming the additive by chemical reaction between iodic acid and hydroxide/I₂ with chlorate in the etching bath

Maeno also discloses forming the additive by chemical reaction of the iodic acid in the etching solution (col 5, lines 9-12)

One skilled in the art at the time the invention was made would have found it obvious to modify Ilardi, Sun and Merchant method by using iodic acid in the cleaner solution because Maeno discloses that the etching agent preferably contains iodine ions

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because the addition of iodine ions changes iodine generated by the etching into I_3^- which dissolves the agent, thereby preventing the precipitation of halogen or the like, thus it is possible to prevent etching defects (col 5, lines 15-19)

Unlike the instant claimed inventions as per claims 13-14, Ilardi, Sun and Merchant fail to disclose the step of replenishing the additive by adding more iodate salt as the iodate salt is depleted

Maeno also discloses the step of adding more halooxoacid salt/iodate salt to the etching solution (col 6, lines 33-50)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Ilardi and Sun cleaner solution by adding/replenish more iodate salt as the iodate salt/additive is depleted in view of Maeno teaching because Maeno discloses that it is preferable that the concentration of halooxoacid salt is at least 0.04 mol/l to produce uniform etching (col 6, lines 54-56)

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ilardi et al (US 5,466,389) in view of Sun (US 6,641,630) and Merchant et al (US 6,458,289) and further in view of Morita et al (US 6,431,186)

Ilardi as modified by Sun and Merchant has been described above. Unlike the instant claimed inventions as per claims 9, 10, Ilardi and Sun and Merchant fail to disclose using additives such as sodium chlorite/chlorite salt

Morita discloses a method for cleaning electronic component using a cleaning solution contains additive such as sodium chlorite (col 3, lines 15-17)

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Since Ilardi cleaner solution is an alkaline solution, one skilled in the art at the time the invention was made would have found it obvious to modify Ilardi, Sun and Merchant cleaner solution by using additive such as sodium chlorite as per Morita because according to Morita, fluids contains oxidizing substance such as sodium chlorite supplemented with an alkaline solution can be used (col 3, lines 12-33)

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ilardi et al (US 5,466,389) in view of Merchant et al (US 6,458,289)

Ilardi discloses a method for cleaning microelectronic substrate. The method comprises the steps of:

supplying a substrate fabricated substantially of silicon (col 5, lines 48-50)

exposing the substrate to an alkaline cleaner solution (col 3, lines 56-60), which reads on exposing the substrate to an etching bath containing a caustic etching solution the cleaner solution contains additives such as chlorite salt, an iodate salt (col 4, lines 21-28)

Unlike the instant claimed invention as per claim 10, Ilardi fails to disclose the steps of removing a portion of the solution from the etching bath, exposing the portion of removed solution to the additive and returning the exposed portion of removed solution to the etching bath

Merchant discloses a method of polishing comprises the steps of removing a used aqueous polishing slurry from the polishing solution/portion of the solution from the etching bath, exposed the used slurry/portion of the removed solution to additives and

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recirculating/returning the exposed slurry/solution to the polishing solution (col 4, lines 45-67; col 5, lines 1-5; fig. 4)

One skilled in the art at the time the invention was made would have found it obvious to modify Ilardi method by adding the step of removing a portion of the solution from Ilardi etching bath, exposing the portion of removed solution to the additive and returning the exposed portion of removed solution to the etching bath in view of Merchant teaching in order to produce a freshly-mixed and conditioned etching solution, thus preventing the contamination of wafers during the alkaline cleaning step

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ilardi et al (US 5,466,389) in view of Sun (US 6,641,630) and Merchant et al (US 6,458,289) and further in view of Lack et al (US 2001/0044264 A1)

Ilardi as modified by Sun and Merchant has been described above. Unlike the instant claimed invention as per claim 11, Ilardi, Sun and Merchant fail to disclose using lithium iodate as an additive

Lack discloses a method for polish semiconductor substrate using a polishing composition/etching composition includes lithium iodate as an oxidizing agent/additive (col 2, paragraph 0039)

Since Ilardi discloses that the cleaner solution contains additive such as an oxidizing agent, one skilled in the art at the time the invention was made would have found it obvious to modify Ilardi, Sun and Merchant cleaner solution by adding additives such as

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lithium iodate as per Lack because Lack discloses that an oxidizing agent that can be added to a polishing solution includes lithium iodate (col 2, paragraph 0039)

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV
August 5, 2006